Holland Tunnel
Beneath the Hudson River between
New York City, New York and
Jersey City, New Jersey
New York City/ Jersey City
New York and Hudson Counties
New York/ New Jersey

HAER No. NY-161

P H O T O G R A P H S

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR
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HOLLAND TUNNEL

LOCATION: Beneath Hudson River between New York City and Jersey City

DATE OF CONSTRUCTION: 1920- 1927

PRESENT OWNER: Port Authority of New York and New Jersey

PRESENT USE: Vehicular Tunnel

SIGNIFICANCE: The American Society of Civil Engineers (ASCE) and the American Society of Mechanical Engineers (ASME) jointly designated, on May 2, 1984, the Holland Tunnel as an engineering landmark "... in recognition of several engineering firsts: an unprecedented tunnel ventilation system and construction of the longest underwater vehicular tunnel and the largest tube in diameter--29.5-foot diameter twin tubes-- at the time of completion." (Quoted from ASME/ASCE press release, May 2, 1984). According to the ASME and ASCE, every subsequent vehicular tunnel has used a ventilation system based on the one developed for the Holland Tunnel.

Historian: Bill Lebovich, HAER, November 1987

Starting in the first decade of the twentieth century, New York State and New Jersey discussed means of improving transportation between the New Jersey and New York City. Originally, it was assumed that a bridge would be built linking them, but the cost of the bridge would have been prohibitive. Once it was decided that a vehicular tunnel would be built to augment the existing ferry running between the two shores, it became a matter of deciding which means of excavating was most appropriate. Because of soil conditions and other considerations, the shield method was chosen over others such as the trench method. According the 1982 ASCE report on the Holland Tunnel:

> In deciding upon the shield method, it was recognized that in the excavation of a trench under the Hudson River, there would be an unavoidable interference with a great volume of river traffic. Fifteen hundred boats would cross the line of the tunnel daily and make every dredge or other machine working in the tunnel an obstruction to traffic. At the New York end, a large mass of ledge rock, involving blasting and removal at great depth, would be a serious obstacle to open-trench excavation under water.
> ...In addition, silt conditions in the Hudson River were regarded as extremely favorable to this method. In a trench tunnel, soft material greatly increases the volume of excavation, while in the case of a shield tunnel this material is mostly easily excavated. (page 5)

Using the shield method, the two tunnels which constitute the Holland Tunnel were constructed. The diameter of each tunnel is 29.5 feet wide, allowing two lanes of traffic per tube, traveling in one direction. *Although identical in diameter, the tunnels differ in length due to the lengths of their approaches on both shores. The north tube is 8,558 feet and the south tube is 8,371 feet.

When the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission gave final approval to building the tunnel, Clifford M. Holland was hired on July 1, 1919 as the chief engineer of the project. He had previously been the engineer responsible for building all the subway tunnels under the East River. One of the major issues Holland immediately turned his attention to was how to provide fresh air to the tunnel. Previous tunnels were adequately served by passive air exchange systems, but the great length and anticipated traffic volumes of this tunnel required a more active system. Holland devised and instituted elaborate tests for measuring the quality of air in vehicular tunnels and then armed with that information, he and his staff designed the system for the Holland Tunnel, which allows the complete exchange of air every ninety seconds.

This system of ventilation is commonly called the Transverse Flow Type and consists of four vent buildings housing 84 fans. Half of the fans blow fresh air in at curb level and the exhausted air is drawn out through the ceiling by the other 42 fans. Each of the ventilation buildings contains blowers and exhaust fans. Two of the buildings are on the New Jersey side, one on shore the other in the Hudson River and the other two buildings are on the New York side, one on shore , the other in the Hudson River.

*A fire underwrite's report stated that the underwater portion of the tunnels..." are of cast iron and steel segments bolted together and protected by a minimum of twelve inches of concrete."(104)

The exertions of Clifford Holland in supervising the construction of what was originally going to be called the Hudson River Vehicular Tunnel are blamed on causing his early death at age 41 on October 21, 1924. His successor, Milton Freeman who had been Holland's Engineer of Construction also died relatively young, at the age of 51 in 1925. So Mr. Holland's efforts were memoralized by naming the tunnel after him and Mr. Freeman is memoralized by having the New York entrance "plaza" named after him.

On May 13, 1949 a chemical truck caught on fire in the south tube, causing several explosions and temperatures sufficient to melt vehicles, collapse the ceiling and spall walls. Yet there were no fatalities, the ventilation system continued to work and the tunnel was reopened 56 hours after the fire started. The National Board of Fire Underwriters investigated the fire and made a series of recommendations and nearly all of them dealt with the need for better regulation of the vehicles carrying chemicals. The fact that the tunnel survived the fire so well and that the underwriters found no structural problems indicate the fitness of the tunnel design and construction.

According to the 1984 new releases announcing the ASME/ASCE landmark designation, the Holland Tunnel continues to be a heavily used roadway, serving 26 million vehicles in 1983 and "On a typical weekday 75,000 autos, buses and trucks use the tunnel."

Bibliography

Landmarks brochure issued by ASME,ASCE, and Port Authority

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